10/24/86 C2150-6

CHILTON-S OCTOBER 1986

FOOD ENGINEERING

SINCE 1928, THE SOURCE ON PROCESSING, PACKAGING, AND PRODUCT DEVELOPMENT

FOOD ENGINEERING

COVER STORY

Our sixth annual New Product Analysis takes you behind the scenes to see the machinations of new product development staffs that each processor hopes will result in the success of his new product offering.

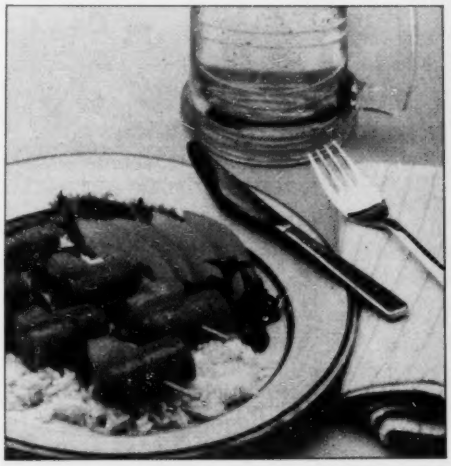
News

12 Industry Report

This month's Report discusses CIM and how companies struggle with cost-justifying the expenditure of capital; pizza consumption continues to climb, meaning growth for the pizza industry and for its suppliers; problem pesticides that continue to pose a deep-rooted concern for the food industry; Tasty Baking Co.'s suit against Ralston Purina over the Drake Bakeries acquisition; the growth in consumption of reduced-calorie products; and corporate news from the industry.

Departments

7 Editorial
10 Calendar
12 Industry Report
27 Marketing Strategies
31 Marketplace
37 Ingredients
136 New In Print
138 People



LUAU LINKS: PAGE 31

Features

53 New Product Analysis

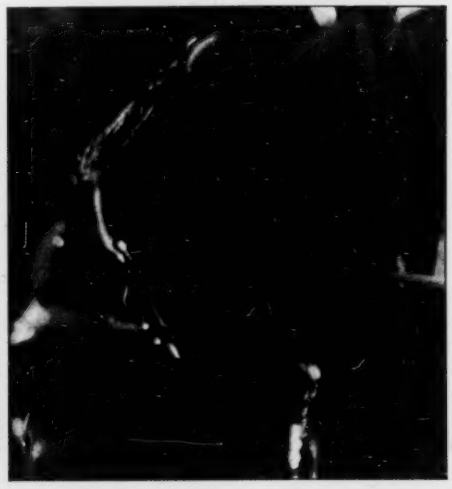
This year's analysis examines the new product development process, from idea to post-introduction. The process must be working: The past 12 months has seen a record-breaking number of products introduced.

75 Is It Time For Thailand?

As more and more U.S. food companies do business in Thailand, *Food Engineering* takes a first-hand look at what the country has to offer. By tapping into the resources of Thailand, U.S. firms have gained labor and market advantages.

83 Acidulants

Recent marketing, regulatory and technological developments have given the acidulants market a shot in the arm. New applications have been found that are boosting the volume of acidulant usage, considered a "mature market".



THAILAND: PAGE 75

Permission to photocopy for internal use or the internal use of specific clients is granted by Chilton Company for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $1.00 per copy of the article, plus 25¢ per page is paid directly to the CCC, 21 Congress St., Salem, MA 01970. Special requests should be addressed to The Editor. (0193-323X/85 $1.00 + 25¢)

FOOD ENGINEERING® (ISSN 0193-323X) October 1986, Vol. 58, No. 10. Published monthly by Chilton Company, Chilton Way, Radnor, Pa. 19089 (Telephone 215/964-4000). Chilton Co. is a division of American Broadcasting Companies, Inc., New York, N.Y. Second Class Postage Paid at Wayne, Pa. 19087 and additional mailing offices. Title registered in U.S. Patent Office ™Chilton Company, 1986. All rights reserved.

POSTMASTER: Send form 3579 to Food Engineering, Post Office Box 2035, Radnor, PA 19089.

CHILTON FOOD GROUP

Food Packaging

42 Controlled Atmosphere
From Europe comes controlled atmosphere packaging and controlled atmosphere storage. Applications range from atmospheres that extend shelf life to headspace pressurization of aluminum cans for added strength when containing non-carbonated beverages.

48 Life Extension
Food engineering, technology and science have one goal: to preserve food by retarding degradation and spoilage. Packaging technology continues to strive to extend the quality of food for an ever-increasing length of time.

50 Barrier Packaging
The grade and thickness of an EVOH layer within the plastic structures of a barrier package can make or break a package. Now there is a computer simulation program to assist in evaluation of barrier performance.

51 Trendwatch
New York's new Jacob Javits Center will host PACK EXPO. That show and other upcoming packaging shows are observed from Bill LeMaire's point of view. Trade shows are still where the packaging industry and the packaging function take stock of their past, present and future.

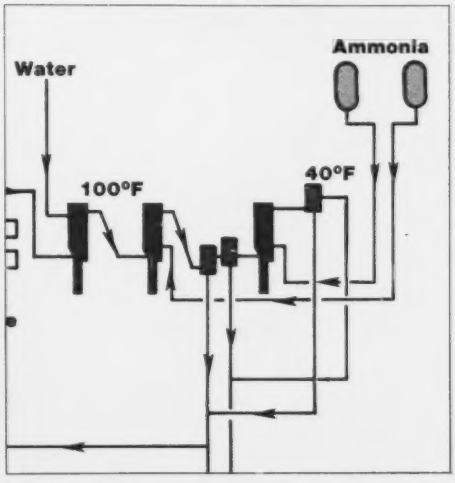
CAP, CAS: PAGE 42

New Equipment

121 Processing Equipment
123 Handling & Distribution
126 Quality Control
131 Packaging Equipment

Supply Line

Field Reports
90 Continuous scraped-surface systems process bacon bits, caramel, salsa
95 Weigh scales smooth distillery's production, inventory controls
98 Selecting the correct gear drive can turn eneregy costs into profit
102 High-performance bulk containers increase reuse and cut labor costs
107 New electronic balances are compatible with plant computers
110 Steam-cooked, flash-cooled potatoes improve flavor, quality of salads
113 Whey ingredients plant now produces value-added powders
117 Bubble-type material protects taco shells from breakage, moisture



CONTINUOUS SYSTEMS: PAGE 90

Special Emphasis

ACIDULANTS:
Acidulants, considered a mature market, have boosted volume and applications in certain market segments thanks to marketing, technological and regulatory advances. **Pages 83 to 88**

CIM: A survival strategy that's an accountant's nightmare

If you ask CIM experts for a definition of computer integrated manufacturing, know what you get? Laughter...hesitation...and evasive tactics, but no real answer.

They will agree that CIM is a total automation strategy that allows adaptation to changing technology, making it possible to keep pace with changing markets and that CIM ties together the manufacturing process with all levels of operation so that the company's strategic business plan can be achieved. But a hard definition is difficult to come by.

Dr. Malcolm Beaverstock, manager of advanced management technology at Foxboro Co. told *FE*, "...There is no one definition...It is a frame of mind and it is a way of operating ...an operating philosophy rather than a package of software."

Ray Meillier, vice president and controller at Campbell USA sees CIM as a "leading edge technology...We recognize it is an R&D effort in a real operations environment."

Rick Marquardt, manager of manufacturing industry for Management Science America puts it succinctly: "CIM is a total business strategy...It is a survival strategy.

And that's what it is

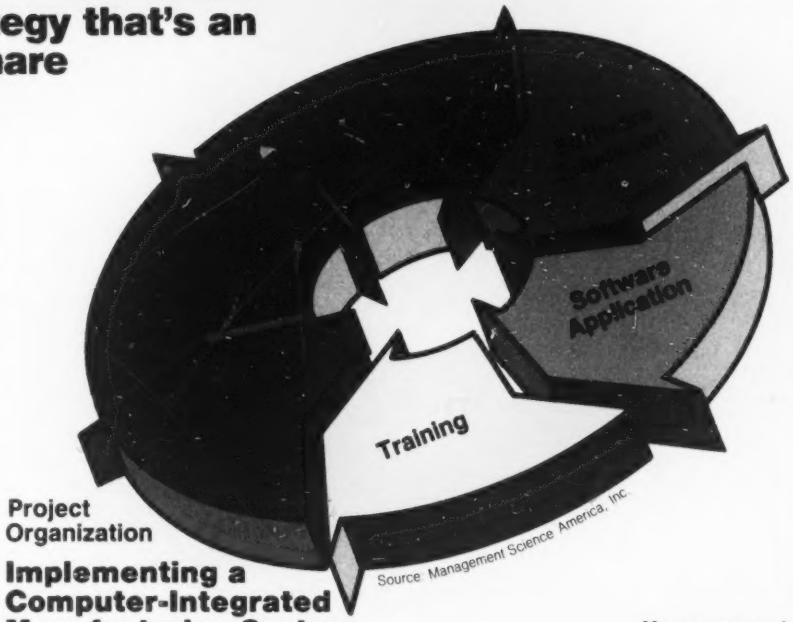
In the competitive, aggressive marketplace of today, CIM is, in truth, a survival strategy.

Beaverstock feels it is necessary to look at CIM with the following strategy: "Can I gather a bigger section of the market if I can put a new product out quicker? Can I get a bigger portion of the market and become a dominant supplier?"

What CIM offers is a system to encompass a company's total operation so that all facets of the organization are working together to produce the product line and achieve marketing goals. It is, says Marquardt, a "total business strategy" and it requires planning and coordination from the boardroom down through all levels of operation through distribution.

In order to implement CIM, however, says Marquardt, "you must have a total plan" for implementing it. It must be a well-conceived, well-orchestrated course of action so the transition will be as easy as possible with mimimal interruption of operations.

But how do you cost-justify a plan when the results are five or ten years away? Industry experts on CIM will tell you that the process can't be justified in traditional terms of ROI, hurdle rates or discounted cash flow. But



Implementing a Computer-Integrated Manufacturing System

Management Science America recommends this approach to implementing a CIM system.

Step aside roast beef... the U.S. is eating pizza!

If you're looking to get into a new line of business, make it pizza. Or be an ingredients supplier to the pizza industry. This crusty italian pie, according to a recent study by MRCA Information Services, is now served in 96 percent of all American households. MRCA further estimates that individual consumers now hoist a slice about 30 times a year.

"We're finding that more and more households are eating pizza at home one day, and in a restaurant another day," said an MRCA spokesman. "The number of households having pizza during a typical two-week period has grown by 16%, but the number of households eating pizza both at home and away from from home has grown 31%," he continued.

Top Pizza Franchises*	Number of Stores		Total Sales ($000,000)	
	1986	1985	1986	1985
Pizza Hut	5,120	4,600	$2,100.0	$1,800.0
Domino's	3,140	2,200	1,100.0	626.1
Little Caesars	900	720	340.0	175.0
Pizza Inn	736	804	120.8	253.0
Godfather's	671	887	265.0	345.0

*Figures are taken from July 1986 issue listing Pizza Today's Top 25 Franchises. Source: Pizza Today

Fiscal year 1986 showed dynamic growth for Domino's pizza, and Pizza Hut continued to be No. 1 in the marketplace.

while justifying it may be more difficult than justifying other decisions, it is harder, according to Marquardt, to justify *not* going ahead with CIM.

Cost-justifying CIM

Mellier says that at Campbell they "do not try to cost-justify CIM because it is a leading edge technology." You can, however, look at "IRR (investment return ratio, commonly used by planners to justify capital expenditures) done on an ad infinitum basis over a period of 10-12 years." This would take into consideration the "residual value of both the technology and the earnings stream..."

Campbell also looks at CIM as having a pay-off value over time. With time, says Mellier, CIM will get "a fair evaluation." And he cautions: "U.S. manufacturers better be ready for the Japanese invasion – they are high tech. That is why we spend money in some cases without totally defined savings. Some of these things are going to be necessary as barriers to entry." CIM then becomes a strategy to ward off further attempts by foreign manufacturers to enter the U.S. market.

"There is no consistent method that anyone is really presently using (for cost-justification)," says Beaverstock, because present accounting systems "just can't cope with CIM...mainly because it is based on an entirely different set of principles – it overemphasizes direct labor and other specific direct costs." So, he says, when a company "cannot manage the numbers," the decision to go with CIM becomes a political one. Rather than funding a project where the numbers have been worked out in advance, the decision to go with CIM becomes part of the company's long-term strategy. In fact, Beaverstock was told by one person whose company was adapting to CIM..."I don't fund projects, I fund strategies."

The savings are real

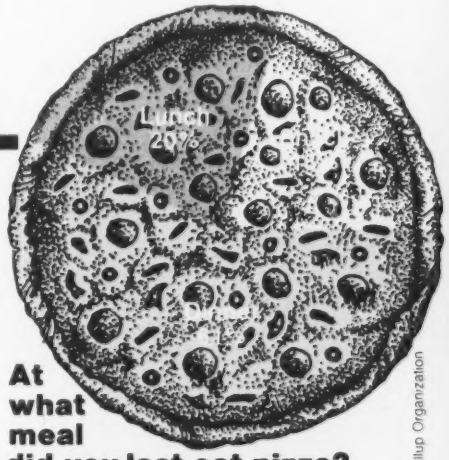
There are, of course, real savings to be realized from CIM, including:

- Inventory savings through a more orderly product flow.
- Better quality assurance – each piece or each batch will be just like the one preceding it.
- The chance to cut down on work-in-process levels.
- Reduction in floor space needed for operations.
- Shorter throughput times.

All of these things will positively affect cash flow and lower product cost. Yet none can have a precise price tag put on them. And there is, of course, a not inconsiderable amount of money to be spent in upfront engineering for CIM (estimated by Foxboro's Beaverstock to be 10 percent of total project cost) and in implementation costs as the strategy is carefully implemented over a lengthy period of time.

So companies continue to struggle with cost-justification procedures for CIM. But, as one industry spokesperson said, echoing SMA's Marquardt, "CIM is something you can't afford *not* to justify."

Look for Dr. Malcolm Beaverstock's bylined article on computer integrated manufacturing in the November issue of Food Engineering.



At what meal did you last eat pizza?

A Gallup Organization study revealed that more people are eating pizza for dinner than for lunch or as a snack.

Source: The Gallup Organization

Pizza has come out of the "snack" division and entered the prime eating time – the dinner hour. According to the *Annual Report on Eating Out* published by the Gallup Organization, 61% of their 1,048 respondents to a telephone interview said they consumed pizza at dinner, while only 20% ate it at lunch and 18% for a snack.

Franchises doing well

A significant trend within the pizza industry is the "carry-in" segment of the market – covering pizza that is delivered, or picked up and carried home. The carry-in share of market has grown 50% since 1981, according to MRCA.

Pizza Hut, the largest pizza chain in the world, has realized considerable success since its inception in 1958. There are now more than 5,120 stores carrying the Pizza Hut banner and sales for 1985 are estimated to be $2.1 billion, says *Pizza Today*, up from $1.8 billion in 1984.

Pizza Hut is not only an "eat-in" pizzeria (menu includes a salad bar and items other than pizza), but also has carryout service. But in an attempt to garner an even larger share of the marketplace, Pizza Hut is this year adding about 500 delivery-only stores to capture a segment of the delivery market.

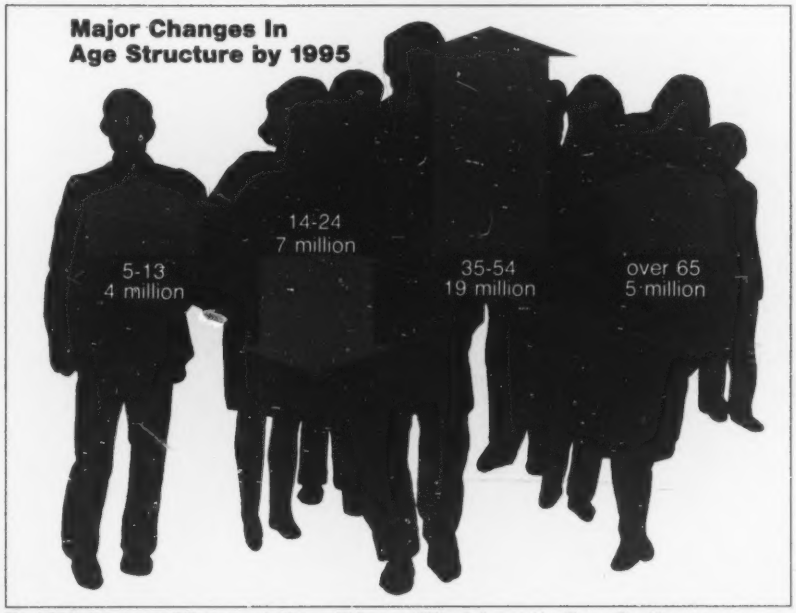
The franchise showing stunning growth, says to *Pizza Today*, is Domino's which grew from $626.1 million in sales in 1984 to $1.1 billion in 1985. Domino's is mainly a delivery pizza business and prides itself on service, promising 45-minute delivery of an ordered pizza or the pizza will be free.

Whether the pizza is being baked at home or is being consumed as part of the carry-in market, the fact remains that business is brisk.

But, says David Fencl of MRCA, "Despite pizza's strong growth over the past four years, many market segments remain underdeveloped. Pizza, perhaps more than any other product we've looked at, seems to hold unique opportunities for segmentation strategies. Manufacturers might be able to choose a particular audience and make a product especially tailored for them." An example: "Dessert pizza" with a range of toppings including nuts and cinnamon and sugar.

So there are still challenges there for suppliers. Find the right niche and it'll be a "piece of cake"...or should we say a "piece of pie"...to find market success.

Changing U.S. demographics will create new market opportunities



By 1995, the age of the population will have shifted dramatically, reflecting a more mature marketplace. The biggest jump will occur in the 35-54 age bracket, with a projected increase of 19 million people.

The U.S. food industry will undergo more change during the next decade than at any time in its history, according to Randall & Co. of Los Altos, CA. The total consumer value of the market will increase from about $400 billion in 1985 to $750 billion in 1995. After estimated inflation of 5 percent per year, this represents real growth of about 1.5 percent per year during the next decade. While this total market growth is lower than many industries, the variability among sectors and change in the trends affecting these totals will be substantial. Customer demographics, lifestyle patterns and overall food consumption needs will shift dramatically.

During this same period, food industry organizations will be aggressively attempting to reduce costs through such means as new, high technology based productivity systems. The resulting competition will be enormous with new competitions, consolidations and battles for market share. Yet, with the resulting changes at all industry levels, there will be more opportunity for real growth. An estimated $100 billion in total real growth will be added during the previous decade in a myriad of new product and service offerings. This is up from the estimated $60 billion of real growth added during the previous decade. Forward thinking organizations will work with these changes and adopt aggressive strategies that will address the new requirements for success in the future.

Demographic changes

The total number of potential customers for food products and services in the United States will increase from an estimated 239 million people in 1985 to 260 million by 1995. This increase of 21 million people represents an average annual growth rate of about 0.9 percent.

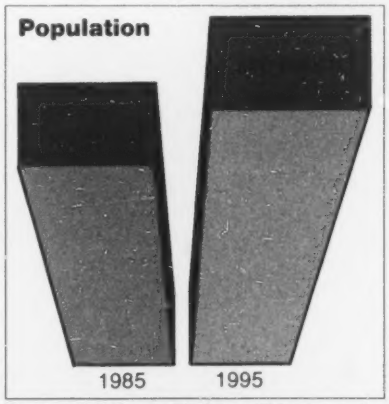
Changes in age structure during the decade will be dramatic. There will be an additional 19 million potential customers in the 35-54 age range. This group, which is composed mainly of people born during the post-War baby boom, will grow more than three times as fast as the total population. There will also be about 5 million more elderly people (over age 65) and over 4 million more young children (age 5-13). Offsetting these increases will be about 7 million fewer teenagers and young adults in the 14-24 age group. This void is the result of the baby boomers growing up.

The ethnic and minority segment of the population will be nearing 25 percent of the population by 1995. Of the 21 million population increase projected during the decade, almost 12 million will be Blacks, Hispanics and other minorities. This group will grow at twice the rate of the total population and nearly four times as fast as the white population.

For the next decade there will be more population growth in the South and West than in the total United States. Population losses will continue to mount in the East and Midwest. Total sunbelt population will increase by 23 million people, with nearly half of this growth taking place in three states: Florida, California and Texas.

By 1995, nearly half of the total labor force will be women. During the decade, women will join the labor force at twice the rate of men, as trends toward gainful employment for women, women's careers and two-income families continue. By 1995, 60 percent of all women age 16 years and older will be in the workforce, up from 55 percent in 1985. The intensification of this trend is further illustrated by the fact that by 1995, the ratio of employed women to full-time homemakers will be two to one. In 1975, this ratio was only one to one.

The total number of households will increase by 17 million units to 104

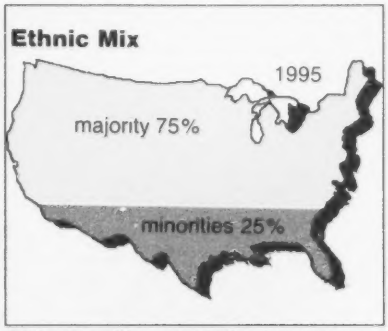


The total U.S. population will increase by less than 10% over the next decade.

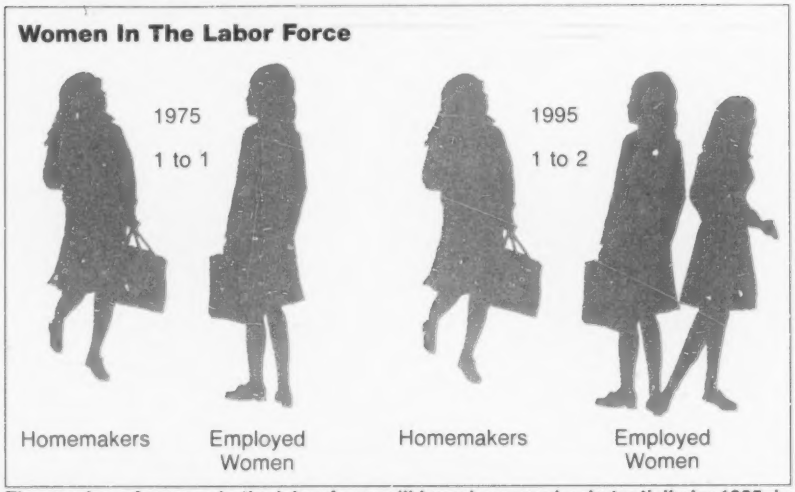
million by 1995 and will grow at an annual rate of about 1.8 percent per year. This rate of growth is about twice the rate of the estimated total population increase. The difference between these two growth rates reflects a shrinking of household size as the number of singles, single parents and single, non-family households grows during the decade. By 1995, 45 percent of all households will be headed by a single or a single parent. Single household growth will be affected by increased acceptance of the single lifestyle, continued high divorce rate, postponement of marriage, increased longevity and more temporary living together arrangements. Traditional families (married couples with children under 18) will represent only 25 percent of all households by 1995, down from 28 percent in 1985. Average household family size will decline from an average of 2.7 persons in 1985 to 2.5 persons in 1995.

Real disposable income will increase by about the same 2 percent real rate as in the past. The reduction of industrial jobs and the increase in service jobs will result in lower relative compensation for some workers. This will be offset by the continued need for management and technical people with higher skill requirements and compensation levels.

Anticipated changes in the demographic and economic mix of the population will result in the United States moving toward a two-tier market for food products and services, tiers that Randall & Company refers to as upscale and functional value. By 1995, an estimated 30-40 percent of the population will be looking for products and services that will provide major benefits beyond pure function, including added comfort, convenience and emotional satisfaction. The maturing of the baby boom population will provide major growth for the upscale category. The rest of the population will be looking for food products and services that primarily provide functional utility at a good value. Many single and single-parent households, the elderly, displaced industrial workers and others on limited incomes will fall into this category. The net result will be the establishment of two, rather than three tiers of consumers. The middle class will essentially fall into one of the other two categories.



Of the 21 million population increase projected during the decade, almost 12 million will be Blacks, Hispanics and other minorities.



The number of women in the labor force will have increased substantially by 1995. In 1975, there was one woman homemaker for every employed woman. By 1995, there will be two working women for every homemaker.

The decade will produce more customer food and food service purchasing decisions that are dictated by wants rather than just needs. This broadening of purchase options will also be accompanied by an increase in the number of inner-directed customers who are taking charge of their own lives, including the aspects of food purchasing and consumption.

Strategic imperatives

In order to manage the coming decade's changes effectively, organizations in every sector will need to implement certain base strategies.

Successful food industry organizations will need sharp **strategic vision** and the ability to manage the strategic planning process.

Excellence in **value-added marketing** will be required in all sectors of the industry.

Quality will have to be a non-negotiable in every organization.

Optimum cost management will be required by all food industry organizations to remain competitive.

Organizations will need to be **people-centered** in order to achieve maximum effectiveness.

Helping to provide industry organizations with the flexibility to achieve strategic objectives will be **decentralized organizational structures.**

The ability of individual food industry organizations to **manage assets** effectively will be a critical determinant of relative success.

Management systems will need to be synchronized with business needs.

Changes in the future requirements of the food industry will dictate new sets of **skills and capabilities** in order to manage effectively.

The strategic management of each organization in the food industry will involve detection of emerging opportunities and threats, predictions of their future impact and development of appropriate organizational responses. Those who understand these changes and the new requirements for success will have the opportunity to attain new heights of prosperity.

Information for this article was obtained from Randall & Co., One-Eleven First St., Los Altos, CA 94022

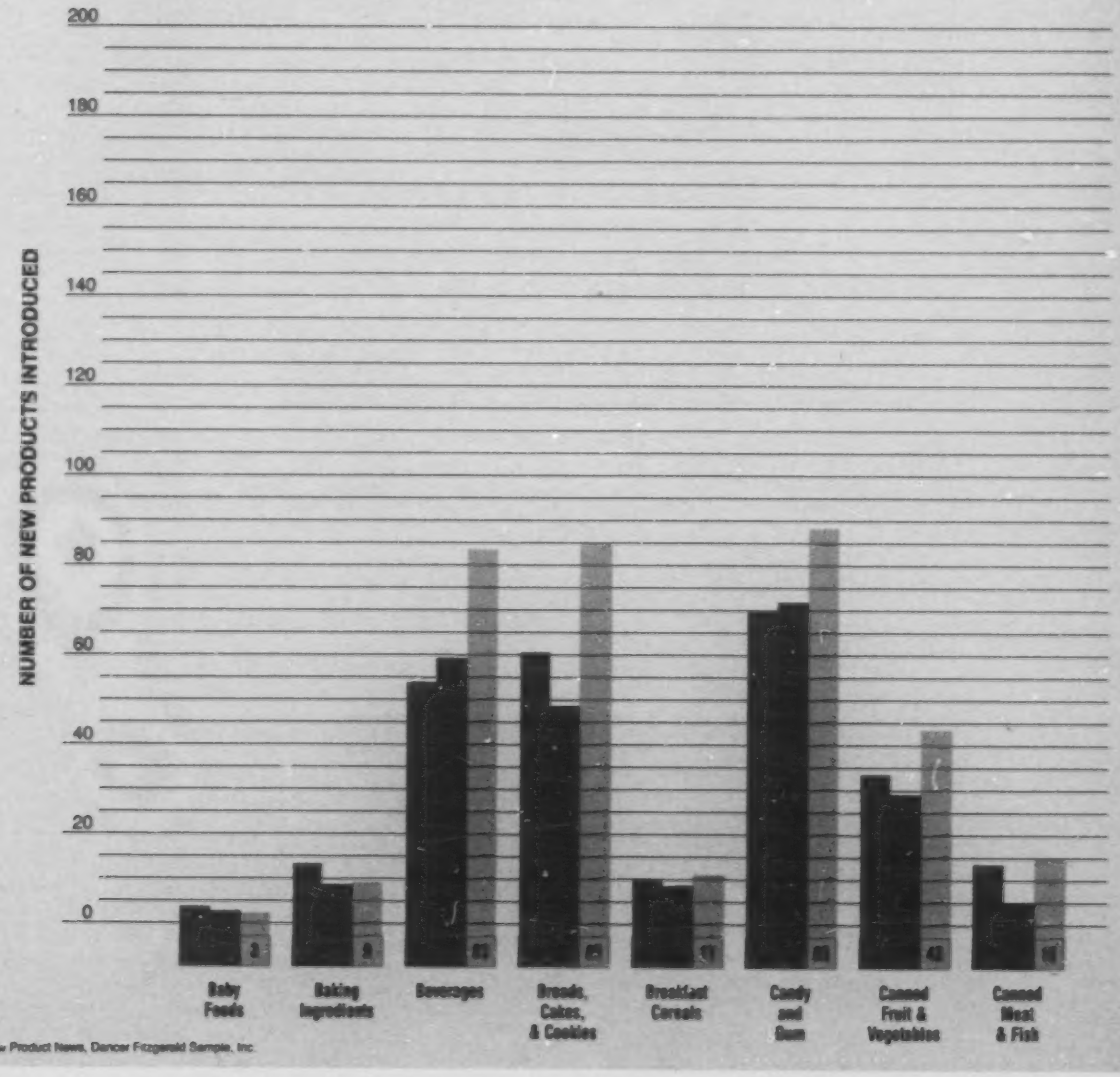
Insert 20 on Inquiry Card →

lowed by taste tests in the lab (shortly before lunch). Several variations of the product are prepared at the lab stage, and one or two may be produced in slightly larger volume by the test kitchen for taste panels.

If all goes well, the new product moves into the pilot-plant. Here, for the first time, a package may be needed. Often, you'll recruit a blank package from stock, since you already have equipment to use it. Meanwhile, Marketing decides how and where to test market the new product. They also come up with a suitable carton design or can label. At this point, advertising for the product already is in a formative stage.

After the initial test market, the data is analyzed and changes may be made to the product, package, advertising, etc. This is where mistakes are corrected and the entire concept is questioned. Sometimes, you have to redevelop the product from scratch. Then, since you're more confident of success, you'll reintroduce the new product into a limited test market, probably using one existing line in your plant. This will give you that much-needed data on how to scale-up to full production. Finally, when the market tests are successful, that same production line will be ready to supply product for a gradual rollout while other facilities are gearing up

1986: Shaping Up Strong Six-month (January to June) comparisons by number of introductions, 1984-1986.



Source: New Product News, Dancer Fitzgerald Sample, Inc.

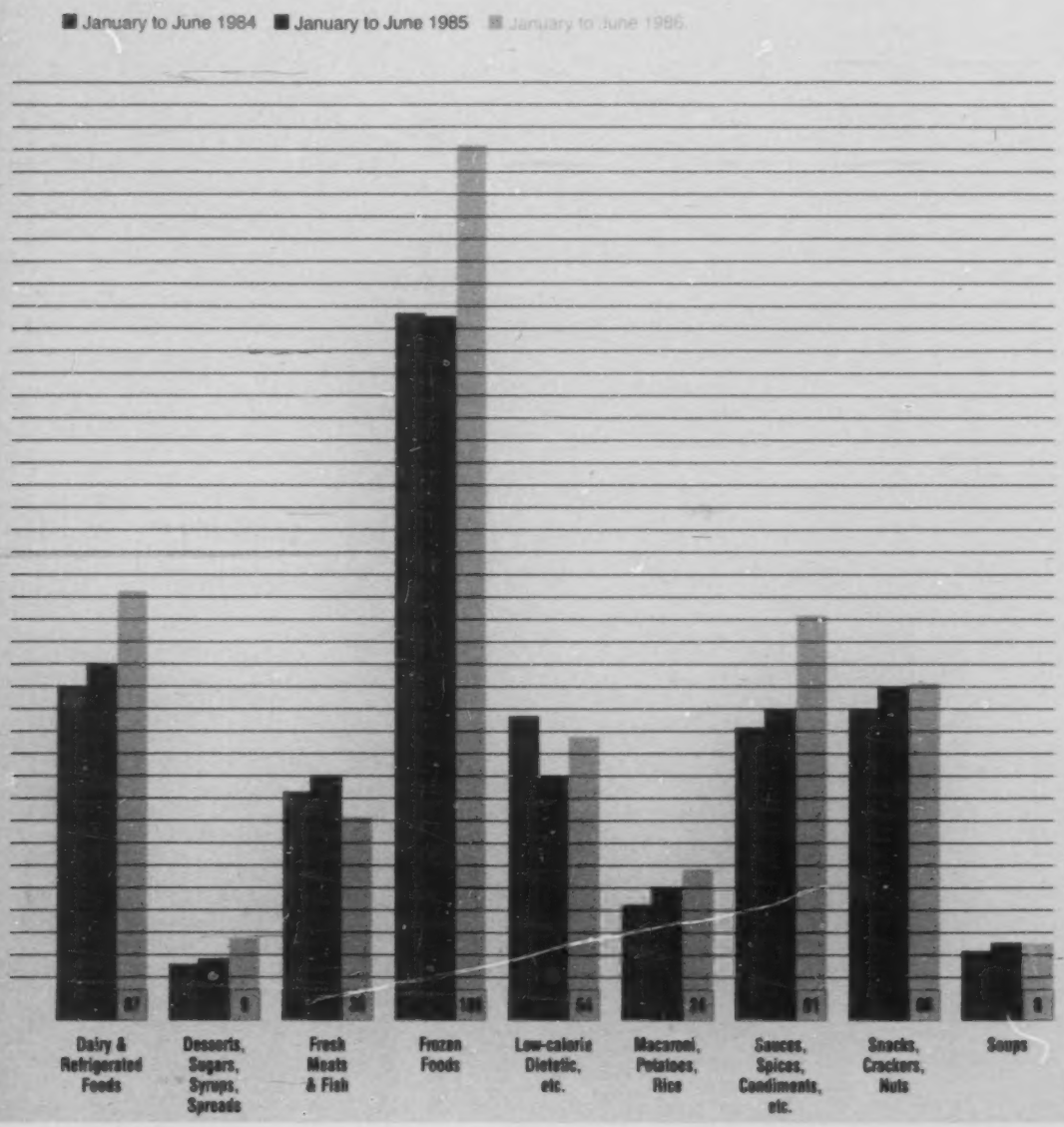
to serve the eventual national market.

That's the general view of the new product development process. But how does it actually work in practice? And who does what? At ConAgra, we discover, R&D does all the new product development. "They decide what products are to be developed," reports Susan K. Hanley, manager of product publicity for ConAgra's Consumer Frozen Food Companies (which markets *Armour, Banquet* and *Delmonte* brands).

At ConAgra, it takes 1-5 years to develop a new product. And the first step is developing a plan to cover concept testing, product name, package design, product testing, volume projections and the marketing plan (advertising, promotions, etc.). The concept for the new product comes from a variety of places, says Hanley: "Consumer trends, basic research, both qualitative and quantitative (focus groups, concept tests), line extensions, new technology (aseptic packaging, microwave), other countries (yogurt) and fast foods (chicken nuggets) are examples."

Hanley explains that "we do consumer tests, test marketing, and we go from there. There's a plan to follow. We stop, and check, and make a decision to go ahead with the new product or to drop it." If ConAgra de-

(Continued on page 58)

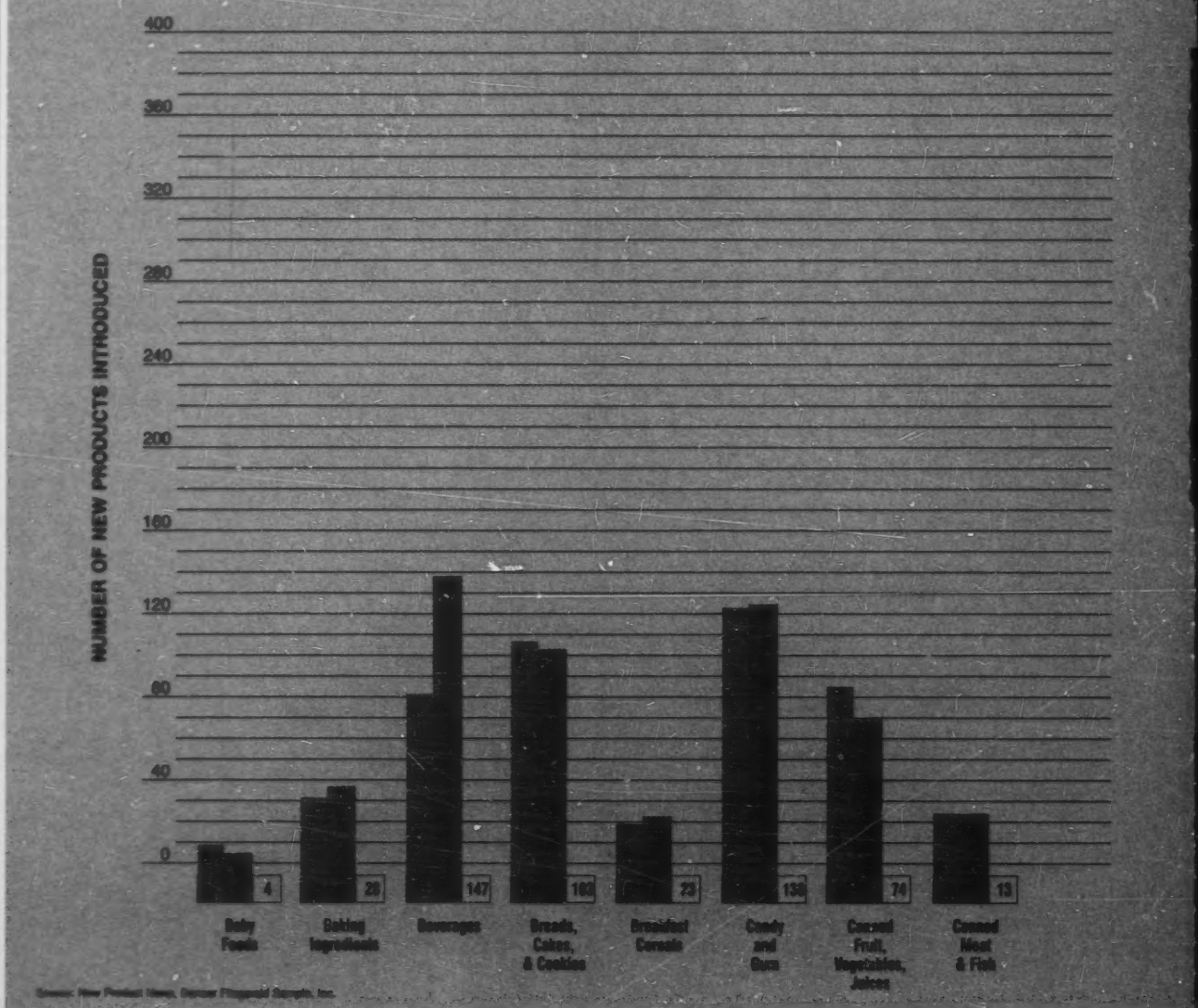


cides to go ahead, the advertising support will vary with the product. "It depends on competitive spending, share of market targets, and the uniqueness of products or positioning," Hanley says. "In the food business, we'll typically spend $5-15 million."

The total cost of developing the product, however, may be much higher. The test market alone, says one food industry executive, can cost $1-2 million. And Columbia Business School Marketing Professor Donna Hoffman recently estimated the cost of bringing a product from R&D through the complete test cycle and into the national market at $3-5 million. And that doesn't include advertising support.

Obviously, at those prices, you have to be careful. An industry observer with considerable experience in food marketing points out: "There are many considerations before deciding to introduce a new food product. Basically, you ask yourself, is there a market? And do you want to play in that market? Given all the considerations, can you compete effectively in that market? In general," he sums up, "you should go with your experience. If you know a market, are producing and distributing for that market, then your chances of success are enhanced."

New Products, 1983-1985 Whole-year comparison's by number of introductions.



Where new ideas come from

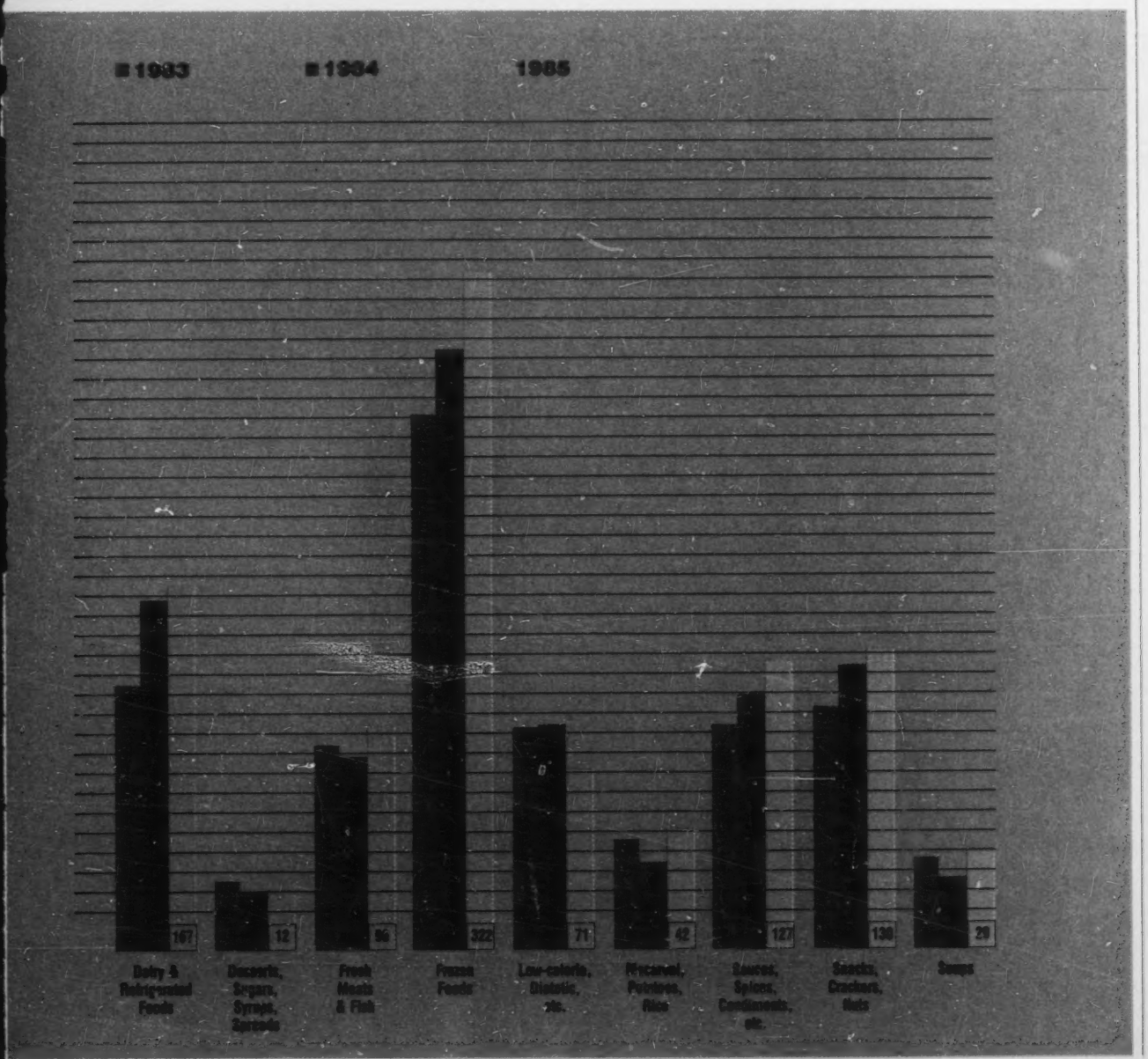
Rare is the new product that comes from a bright mind and springs directly to the retail shelf. One expert notes that "a host of folks" are involved in bringing products to market. "Certainly, marketing people are in at the concept stage. Then you being to work through Quality Control, Production, Home Economics, the focus groups, panels and test markets. By that time, the product is pretty well developed."

At General Foods Corporation, for example, Peter A. Acly, associate manager for corporate issues, explains where these concepts come from: "Development of our new products can be sparked either by the 'push' of advancing technological capabilities or by the 'pull' of the marketplace. Sometimes it's a combination of the two.

"On the technology side," says Acly, "that 'push' has a lot of muscle behind it. General Foods now spends about $120 million per year on research—about 15% of total U.S. food industry research expenditures.

"During the next decade, consumers will see the results of dramatic technological developments in many fields. These include biotechnology, our understanding of human taste perception, new non-chemical preser-

(Continued on page 62)



vation systems, our knowledge of nutrition and health, and processing technology in general. All of these are subjects of major research programs at General Foods.

"The 'pull' of the marketplace is also a key factor. We've witnessed sweeping lifestyle changes in the United States in recent decades—working mothers and single-parent families, for example. These changes are having major effects, both on attitudes about food and on purchasing behavior.

"General Foods stays in touch with consumer needs in several ways. Our Consumer Center interacts directly with over a hundred thousand consumers every year—through focus groups, letters and calls to our toll-free numbers. We also use syndicated surveys to track consumer attitudes on a range of issues. These methods help us to learn what consumers are thinking and pinpoint voids in the marketplace.

"New product development occurs in the context of constant interaction between the technical research, marketing and consumer affairs functions. That process of feedback and interaction is vital to ensure that

New wine coolers despite shakeout

Although the wine cooler market's expected shakeout out has begun, the onslaught of new product entries continues. To verify this one only needs to look at the accompanying chart showing the wine coolers introduced from the beginning of 1986 through last July. It is also interesting to note that the new coolers are from large and small companies alike.

But amidst these new market entries, a number of companies are pulling their product from the market. Coors withdrew its malt-based *Colorado Chiller*; Schlitz pulled *DuBonnet Splash* from test markets; and *Wine Time Cooler* is no longer available from Sante Mineral Waters—a recent Anheuser-Busch acquisition. It seems surprising that with several of the giants pulling wine coolers from the market, a steady flow of new

Wine Coolers, 1986

The growth of the wine cooler market is perhaps best illustrated by the fact that between January and July of this year, 26 new players hit the shelves.

Product	Manufacturer	Comments
January		
I.C. Cooler	Pittsburgh Brewing Pittsburgh, PA	malt-based citrus beverage
Hi-5 Cooler	Tom Pree Wine New York, NY	made from 100% NY state grapes
Kedem Cooler	Royal Wine New York, NY	kosher, contains 5% wine
Bachelor Wine Cooler	SCS Cellars Roseburg, OR	made with Oregon red wine
February		
Bavarian Berry Wine Cooler	21 Brands New York, NY	imported, German product
Matusalem Wine Cooler	Ron Matusalem Auburndale, FL	contains rum and citrus
Country Cooler	Vineyards Unlimited Los Angeles, CA	raspberry, garden strawberry, and fruit punch flavors
White Mountain Orange Cooler	Stroh Brewery Detroit, MI	orange flavor being added to line
WP Cooler	Bedford Tuscon, AZ	made from California chablis and natural fruit flavors
20/20 Raspberry Cooler	The Wine Group Ripon, CA	line addition
California Splash Cooler	California Splash Pleasonton, CA	fruit flavor added to line
April		
Pommay Cooler	Cidermill Distributors Roseville, CA	apple cider cooler with 4% alcohol
Tropical Cooler	California Cooler Stockton, CA	third flavor—tropical—added to line
Piña Cooler	Joseph Victori Wine Brooklyn, NY	piña flavor added to Calvin Cooler line
Wine Cooler Mixer	Party Tyme Overland Park, KS	two parts mixer is blended with one part wine

technological developments and expertise are applied in the most effective way.

"Decisions on the launch of a new product are made through an ongoing evaluation process, as the product moves from a limited Home Use test, for example, into a specific test market and then into either regional or national distribution. Product management is constantly evaluating both the product and the marketing plan that supports it.

"The specific marketing plan employed is structured to meet the needs of the product in question. The plan will employ a mix of tactics, balancing advertising, consumer and trade promotions and—moreso in recent years—public relations activities."

Most marketing experts contacted by FE agree on how the new product should be promoted. "Support during the introduction can include a lot of different things—coupons, ROP (Run-of-Press) ads with coupons, television (and sometimes radio), magazines, sampling. It depends on the product and whether it's new or a line extension. There could be a big special event. You

(Continued on page 66)

Product	Manufacturer	Comments
May		
Golden Wine Cooler	Seagram's New York, NY	"with premium wine taste"
Sun Country Flavors	Canandaigua Wine Canandaigua,	two flavors added to line—cherry and peach
Champale Coolers	Iroquois Brands Trenton, NJ	orange mimosa, strawberry daiquari, citrus sparkler, & pina colada flavors
Georgia Peach Wine Cooler	G. Heileman Brewing La Crosse, WI	peach flavor added to Country Cooler line
Dewey Stevens Wine Cooler	Anheuser-Busch St. Louis, MO (4% alcohol)	reduced calorie wine cooler
June		
Niagara Wine Cooler	Widmer Wine Cellars Naples, NY	wine, grape juice, & & club soda
July		
Tropic Sun Wine Cooler	SVPW Havre de Grace, MD	orange juice & NY state white wine
Cream Coolers	Old Dutch Imports Orlando, FL	strawberry cream & banana cream dairy-based, low alcohol
T.J.Swann Chocolate Cooler	Heublein Farmington, CT	wine-based with natural artificial chocolate flavors
Zinfandel Wine Cooler	The Wine Group Ripon, CA	made with varietal wine
Squirt Wine Cooler	Squirt Holland, MI	combines MI and CA Wine with Squirt

Source: New Product News, Dancer Fitzgerald Sample, Inc.

ones continue to be introduced.

One reason for this can partially be found by examining the phenomenal product category growth. When California Cooler created the product category in 1981, it shipped 700 cases of product. By 1984 the industry shipped 12.4 million cases. This has made wine coolers a $700 million product category.

Wine coolers are a combination of wine (usually white), fruit juice and/or flavors, citric acid, water, and carbon dioxide. They contain approximately six percent alcohol, about half that found in wine. This reduced amount of alcohol and the "healthy" image of fruit have contributed the wine coolers' success among a generation of health-conscious Americans.

Yet even with the shakeout among wine coolers, the $700 million market has created a lure that continues to attract new companies looking for a piece of the action. Many of the new products are aimed at finding a niche not yet filled. For example, the Franzia *White Zinfandel Wine Cooler* is trying to attract the more sophisticated table wine drinker by using a varietal wine. And, Anheuser-Busch is appealing to those who feel 6-percent-alcohol still adds too many calories by offering a 4-percent-alcohol wine cooler.

New flavors are also being used to attract people with peach, piña colada, and even chocolate (an exception from the fruit product) among the new varieties.

As new wine coolers continue to appear on the market, the shakeout will intensify but some of the new entries may end up as winners. And it is this possibility that continues to attract new wine coolers into an already crowded but lucrative field.

roast or a center loin can be prepared in a conventional or microwave oven. Initial distribution for this line is in Oklahoma City.

Research

Many retailers are now trimming fat from meats to 1/4 inch rather than 1/2 inch. This will amount to 13 millions pounds of fat being trimmed a year by Kroger alone. But reducing the fat content doesn't stop here. Researchers at the Texas Agricultural Experiment Station have found that altering the diet of pigs can result in a lower saturated fat and total fat content.

In addition to studying diets, research into producing leaner meats has extended to extensive breeding programs. The results of one of these programs, begun about 10 years ago, is just reaching retail shelves. *UltraBeef* is the result of a research program involving Simmental cattle—originally imported from Switzerland.

The cattle used for UltraBeef weight an average of 60 to 90 pounds at birth in comparison to regular cattle which weigh 40 to 60 pounds at birth, explains Nathan Mash, president of MASH Meats which will be marketing UltraBeef. The higher initial weight in combination with a computer-controlled feeding program enables these cattle to be ready for slaughtering nine to twelve months earlier than traditional beef cattle. Since the cattle are younger at slaughtering time, the result is more tender beef, says Mash.

But the biggest advantage of UltraBeef is the reduced fat in the final product, resulting in more meat per pound of animal. Mash points out that this also translates into a beef with 38 percent fewer calories and 38 percent less cholesterol than traditional beef.

UltraBeef will be able to be labeled *Lite* under the USDA's new labeling policy regulating the use of *lite* and *lean* on foods containing meat and poultry. The new policy stipulates that:

- *Extra lean* will be reserved for products that contain no more than five percent of the fat found in the majority of similar products.
- *Lean* and *low fat* are for products containing no more than 10 percent of the fat of the majority of similar products.
- *Light, lite, leaner,* or *low fat* are for products containing at least 25 percent less fat than the majority of similar products.

In the area of pork, Swift Independent, Chicago, has introduced *Lite Pork* with 25% less fat. Currently, two of Swift plants have USDA approval to produce Lite Pork. Chemical analyses are run at the plants to test for total fat, calories, protein, and carbohydrates of the pork. The lite pork is produced by both trimming the cuts of meat to 1/8 inch fat and by paying premium prices for leaner hogs. Swift Lite Pork was available in 600 to 700 supermarkets nationwide last summer—a number expected to double by this month. Some supermarkets are absorbing the extra cost of Lite Pork, while other are passing it on to the consumers but report consumers are willing to pay extra for leaner meat.

Advertising/promotion

Without advertising, many consumers will remain unaware of these new, leaner meat products. The Beef Industry Council, representing everyone from ranchers to retailers has undertaken a $10 million national advertising campaign. Its theme is "Beef is healthy and necessary for a balanced diet—it's the fat you must avoid."

By educating the public to identify fat—not red meat—as the culprit and then providing leaner cuts of meat, the meat industry has begun the uphill battle of winning back consumers. And while meat may not regain it former status, it is beginning to outgrow its bad-for-you image.

might promote the product by getting on radio talk shows, demonstrate it on television, and prepare special stories with recipes for the food section of newspapers."

Where and how to market test

U.S. marketers currently spend at least $1 billion annually to test market new products. But, the experts agree, there are no firm rules on how to do it. Recently, William M. Shaffer, public relations manager at General Mills, was quoted as saying: "There's no formula to predict how a product will be greeted at first in the marketplace, or what will happen to it after it gets there. The only constant about the test-marketing process I can identify is that there are no constants."

One rule of thumb is to avoid areas where the product is either heavily accepted or almost totally unknown. And you should test in at least two widely spaced markets. Campbell Soup Co. introduced *Prego* spaghetti sauce in Youngstown, OH and Green Bay, WI, for example. And Pepsico tested its *Lemon-Lime Slice* in Phoenix, Milwaukee, Rochester and Tulsa. The second *Slice* flavor, *Mandarin Orange,* was tested in Phoenix and Hartford. Then, last spring, two more *Slice* flavors were rolled out nationally without any test marketing.

A relatively new and low-cost method of test marketing a product is to use electronic mini-markets, often a small town with only a few supermarkets. The test is likely to be performed by a firm such as A.C. Nielsen Co., which guarantees confidentiality. In effect, Nielsen signs up a large group of consumers and supplies them with "member" cards that are scanned at the market along with their regular purchases. That gives Nielsen electronic fodder for its data bank, and a daily log of product movement.

Electronic testing can give you a better handle on household demographics. By using direct mail, you can run 2-3 tests in the same city, comparing ad appeals. Electronic market testing is still new, though, and it's limited, so traditional methods of market testing will continue to be the standard.

Case history of a new product

Nabisco Brands USA, now a part of R.J. Reynolds Industries, invests about $50 million annually in R&D. Last year, Nabisco's earnings from operations increased 19 percent on a sales gain of 3 percent. Several factors contributed to this increase, including the success of new product programs.

In 1985, Nabisco maintained a leadership

(Continued on page 68)

position in U.S. cookie and cracker markets due largely to the success of new products such as *Oreo Mint Cremes*, *Blueberry Newtons* and *Cherry Newtons*, and a 15-variety line of snack crackers—built on the *Wheat Thins*, *Better Cheddars* and *Great Crisps* brands—that increased snack cracker volume 21 percent. Nabisco also introduced three low-salt crackers.

The popularity of *Planters Honey Roasted* nuts helped generate increases in Planters volume and market share. And Nabisco hot cereals increased share in 1985 due partly to the successful relaunch of *Mix 'n Eat* hot

New foods developed specifically for microwave ovens

As the number of U.S. households with microwave ovens continues to climb, more and more products are being developed specifically for preparation in a microwave oven. Microwave popcorn has been around for a while, but new brands continue to be introduced. And new products such as *Hot Scoop* (a microwaveable sundae—see *FE*, September, 1986, p. 53), *Microwave Peanut Brittle*, *MicroFresh Vegetables*, and *Microwave Tater Tots* are becoming more and more common.

Earlier this year, Paul Newman expanded his product line to include *Newman's Own Microwave Popcorn*. The product contains three pop-and-serve packages and carries a suggested retail price of $2.25 a box.

Curtice-Burns and Deli-Express have also introduced popcorn products this past year. Curtice Burns' National Oats, Cedar Rapids, IA, is offering a premium priced *Super Pop Microwave Pop Corn*. And Deli-Express, Eden Prairie, MN, is attempting to carve a specific niche in this category by offering

microwave popcorn seasoned with Lite Salt. Both regular and butter flavors are available. Also new in this category is American Pop Corn Company's *Jolly Time Microwave Popcorn* with white kernels.

If your taste does not run toward popcorn, there's always microwaveable peanut brittle from Peerless Confection, Chicago. One cup each of *Peermelts Butter Buttons* and nuts are cooked in a microwave oven for five minutes. A homemade peanut brittle results when the mixture is cooled.

On the Italian front, Pillsbury has added a *French Bread Pizza* to its line of microwaveable pizza products. Packaging for these products includes a silver-colored tray designed to ensure that the pizza maintains its crisp-crust texture throughout the microwave process. Pillsbury Microwave French Bread Pizza comes in four varieties: cheese, pepperoni, sausage, and a combination of both pepperoni and sausage.

Ore-Ida's new line of microwaveable potato products also includes a specially designed package to help crisp the product during cooking. The boxes are constructed so the top flap can be folded around under the bottom of the package during microwaving. A *Qwik Crisp* board in the bottom of the package aids in providing a final crisp product.

In addition to a specially designed packaged, Qwik Crisp potato products are formulated specifically for microwave cooking. Tater Tots, Crinkle Cuts, and Hash Browns are offered in this line.

Maintaining a crisp microwaveable product is not the only challenge processors face. Packages with high water content products in them cannot allow that moisture to leak out. This was one of the considerations in designing the boxes for *Micro Fresh Vegetables*. A double poly-coated carton is used due to its low moisture vapor transmission rates. MicroFresh Vegetables are prepared by opening the package's lid, adding two tablespoons of water, closing the lid, and microwaving.

MicroFresh Vegetables are manufactured by Patterson Frozen Foods, Inc., Patterson, CA. The company mostly produces products for private label but is developing the MicroFresh line for companies interested in marketing the product under that label. About 20 items are offered in this line, including chopped broccoli, cauliflower in cheese sauce, cut leaf spinach, and Hawaiian style vegetables.

As the microwave oven becomes an even more common appliance in American kitchens, foods developed specifically for microwave preparation will become even more plentiful.

cereals. In ready-to-eat cereals, encouraged by consumer interest in nutritious foods, the company introduced *Nabisco Shredded Wheat 'n Bran* cereal in 1985.

Clearly, Nabisco is a highly successful company when it comes to developing and marketing new food products. But how do they do it? For an answer, let's look back a few years to 1983, when Nabisco introduced one of the most successful new products in its history – shredded wheat & raisins.

Toasted Wheat & Raisins is a 100%-natural, shredded whole wheat, bite-size biscuit. "Its basic strength," says a spokeswoman for the Grocery Products Division (GPD), "is that it's the only raisin cereal with no added sugar or salt." Nabisco's first ready-to-eat breakfast cereal in 15 years, it represented an incremental business worth many millions of dollars a year. To market it, the GPD invested $14 million – more than it had ever spent on any one product.

"Our first step was a Concept Screening Program," says the spokeswoman. "Basically, we presented consumers with more than 40 concepts of new ready-to-eat cereals based on shredded wheat technology. They singled out one as exceptional – a raisin cereal made from natural whole wheat with no added sugar and no added salt."

The new cereal combines two food textures and flavors that are highly desirable to consumers: crispy, toasted *Shredded Wheat* cereal and soft, sweet California raisins. So, in the early development stages, R&D experimented with several sizes and shapes of cereal biscuits for manufacturing feasibility, consumer acceptance and compatibility with raisins. "The size and shape of the biscuit were critical to achieve even raisin distribution from top to bottom in the cereal box. We wanted every bowl of cereal to contain the right amount of raisins."

Under a Brand Manager, the product development team conducted plant trials, and in-house and consumer taste panels before selecting a smaller, lighter-weight version of the *SPOON SIZE Shredded Wheat Biscuit*. California seedless raisins (from *Sun Maid Growers*) were selected from several possible types because of their lighter color, smaller size and sweeter flavor.

Next came a volumetric test – in which consumers are surveyed in a shopping mall environment and exposed to the product, package and key selling message. They're then given a sample box of product and, after a week or two, are contacted and asked questions about the product.

(Continued on page 72)

New foreign foods with doubtful U.S. appeal

Foods popular in foreign countries have often served as the impetus for successful new products in this country. The croissant, yogurt, and surimi-based foods – to name a few – all had their beginnings in other countries. Successful launching of new products, though, does involve correctly identifying acceptance by the intended consumers.

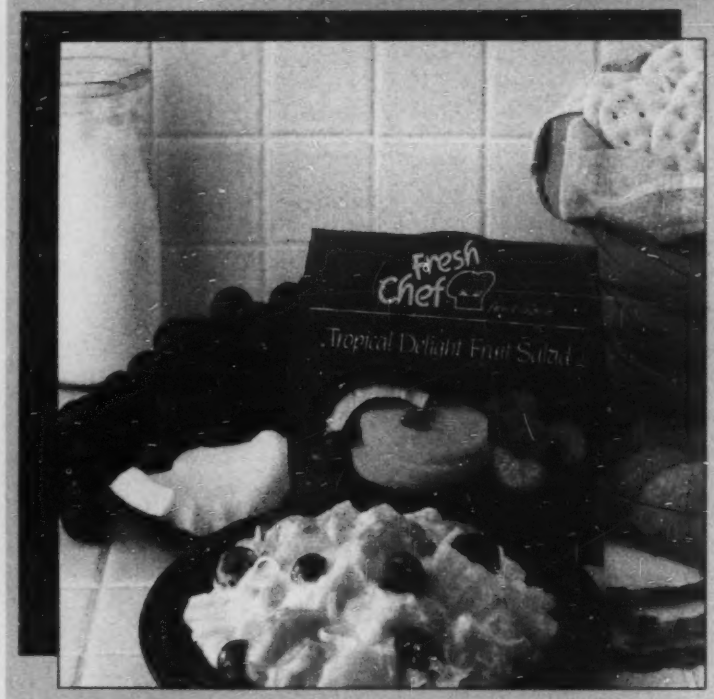
Our sister magazine, *Food Engineering International*, recently conducted a survey of new products throughout the world. And while the world seems to be getting smaller in terms of varying tastes, there are still numerous products popular in foreign countries that the majority of Americans are not ready to accept and, perhaps, may never be willing to accept. One of these is a frozen dinner recently introduced in Singapore – *Curry Fish Head*. Part of a new line of frozen entrees, Curry Fish Head can be heated in a steamer or microwave oven. It is also offered in an institutional pack size.

Also from the Far East hails another new product that would probably meet with doubtful success in U.S. markets. A *chocolate covered pickled scallion confectionery* is among the new products in Japan. The product is made by placing pickled scallions in a sodium alginate solution and then a calcium chloride solution to prevent the scallions from drying out. They are then chocolate coated. But then there are those U.S. consumers who some claim would eat anything that is chocolate-coated.

From the other side of the world comes another new product *Heinz Spread* in Tomato and Onion; and Celery, Corn & Apple varieties. These recent additions to a line of spreads in England are part of an accepted concept in England which has not caught on in the U.S. These spreads are sometimes used on their own as a sandwich filling, or are sometimes used to "liven up" a sandwich. The original varieties are Cucumber and Sandwich Spread.

As global marketing becomes more widespread and ethnic or foreign foods become more and more common in this country, there will always remain those products which appeal to only a segment of the world's population.

A new product in Singapore, this frozen Curry Fish Head frozen entree, will most likely not become a popular U.S. dish.



Growth seen in refrigerated foods

It comes as no surprise that refrigerated sections of supermarkets are expanding. Consumers—in their ongoing search for convenient, high quality foods—are turning to value-added, refrigerated foods to provide "home cooked" quality without a major time investment. Speaking about Campbell's *Fresh Chef* line, Martin Buchalski, general manager of the refrigerated-foods business unit said, "Growth in our new Fresh Chef refrigerated line is testament to the strong consumer demand for refrigerated foods that exists in the marketplace."

Test marketing of the Fresh Chef line began in October of 1984. Currently the line—which includes salads, sauces and soups—is in 85 percent of the country. Introduction of entrees and desserts to the line will follow. The salads have a shelf life of approximately two weeks, and the soups and sauces have a four to five week shelf life. And to ensure freshness, the salads are produced at six locations around the country and shipped directly to retail outlets.

The first full line of refrigerated, value-added products to be offered on a national level come from ConAgra Inc. An independent operating unit, ConAgra Deli Co., was formed to handle this line of 80 new products—which includes entrees, salads and pasta, breaded products, cheese, and processed meat items. Another major processor looking for a piece of the refrigerated, value-added market is General Foods. It is testing marketing a line of refrigerated dinners under the *Culinova* label in selected Northeastern supermarkets.

One reason making it easier for national processors to distribute fresh, refrigerated foods is improved distribution. Deregulation of the trucking industry brought increased competition, lower rates, and reduced the times of trips. This—coupled with innovations such as atmospheric-control systems that regulate the temperature, humidity, and other conditions in storage areas and truck trailers—allow fresh items to arrive at supermarkets in better condition. And desire for higher quality foods is a major reason consumers purchase refrigerated foods.

The Brand Manager then took the consumer data, along with the proposed advertising spending plan, trade and consumer programs, and put them into a sophisticated computer model. With these elements of the marketing mix entered, the computer came up with the volume potential.

"The answer was loud and clear," says the spokeswoman. "*Toasted Wheat & Raisins* was right on target! The volume estimate met our objective and the project was given the green light." Thus, in the spring of 1983, the Niagara Falls, NY, bakery began shipping *Toasted Wheat & Raisins*—half a month ahead of schedule.

To launch a new ready-to-eat cereal requires a major investment. The *Toasted Wheat & Raisins* advertising program, for example, was designed to generate over two billion household impressions, and to deliver an average of over 25 commercial announcements to every television household in America. These messages were backed up with a major coupon drop—43 million, 25-cents-off, high-value coupons delivered by a 4-color, half-page Sunday newspaper insert plus a 35-cents-off coupon.

In September, 1983, Nabisco shipped three million trial-sized packages which included a coupon worth 15 cents against the purchase of the regular 14-ounce size. All in all, the advertising and promotion was expected to reach 83 million television households. And the total coupon campaign was worth more than $40 million to consumers.

Moreover, to create excitement about the new product, the GPD supported the rollout with a public relations program. Its aim was to generate consumer awareness, encourage trial, communicate the complete health and nutrition story, establish a unique position in the consumers' minds for the new brand, and build brand loyalty.

"The introduction of *Shredded Wheat & Raisins* is an excellent example of how dedicated teamwork can lead to a successful new product launch," reports William B. McKnight, GPD president. "All areas of the Division contributed to this success—Market Research, R&D in the original development, Manufacturing in providing a new form of cereal processing, and Marketing & Sales in preparing the introductory plan.

"This close teamwork allowed for the development and consumer testing of many alternative options in product formulation, packaging, names and in advertising approaches. Consumer testing has proved successful with other new products. We feel that, through this approach, the odds for success are dramatically improved."

IS IT TIME FOR THAILAND?

Alluring incentives in hand, the Thais are hunting food companies.

JIM WAGNER
Editor-in-Chief
Food Engineering International

Thailand, like a great many Southeast Asia nations, is looking to come increasingly into the twentieth century, and looking to do it through the twentieth century's most available means – capitalism. It is actively seeking investors, and the industry it is pursuing most fervently is not chemicals or electronics but food processing.

The Thai food industry has made great strides in the last five years. During the early '80s, annual growth averaged 23 percent. However, gross sales only averaged 20 billion baht, about US $769 million (one dollar = 26.1 baht). In comparison, General Foods's *net* sales in 1984 were $8.6 billion.

The Thai Board of Investment (BOI) would like to improve these numbers dramatically. To do so, it is searching for food companies with the money and desire to reach Asian markets.

Another motive

The BOI has other reasons for seeking foreign capital. Thailand wants to kickstart its sluggish economy.

Over the last twenty years, Thailand became the most progressive nation in Southeast Asia. It had a model economy. Gross domestic product always grew by at least 7 percent annually. Buoyed by tin, rice and cassava, money was available for new

(Continued on page 76)

←Insert 35 or see FEM, p. 169

roads, power plants, a satellite communications system, a municipal water system, and the creation of large industrial estates around but not in congested Bangkok.

In the last two years, Thailand's financial growth slowed to a crawl. Prices for Thai rice and tapioca sagged. The bottom fell out of its ailing tin industry. Thailand still fared better than other Asian nations, but the gap began closing. GDP grew 6 percent in 1984, only 4.1 percent in 1985 and is expected to remain flat this year.

Realizing foreign investment was essential to stop the slide, the Board of Investment took the offensive last year. The BOI is empowered to deal using a lucrative incentive program. It doesn't hesitate. Already many "big name" food companies have begun operations with the BOI's assistance. Among those are Nestlè, General Foods, Foremost Dairies, Dole, Daily Foods Ltd., Roza Food Products, Brook Foods, and CPC International (making Best Food jams and jellies and Knorr dehydrated foods). More recent deals are in negotiation between Nabisco and Thai Dairy, and Oscar Mayer and the CP Group (CP is Thailand's largest food concern).

Here, on a fish cleaning line, we see one of Thailand's greatest resources – its people.

Ingredient suppliers also have come to tap the rich flow of commodities, especially cassava. National Starch, International Flavors and Fragrances, and Griffith Laboratories are just three examples.

With the right backing, Thailand's food industry could become a major player in the Far East. That's what the government is hoping for, and what the BOI is working toward. "We want and need to become the supermarket of Asia," said Staporn Kavitanon, deputy secretary-general of the Board of Investment. "We certainly have a base in our commodities. Thailand is the fastest growing exporter in the world. Once we imported sugar. Today we export 95 percent of what we grow. We were number one in pineapples last year -- 20 million cases in a 50 million case market. With rice, we are the number one exporter, even greater than the U.S. Our cassava crop dominates 95 percent of the world market. You can see our greatest potential is agribusiness."

Only the beginning

If anything, the BOI is more active this year. Consider its latest effort. In June, a delegation lead by Staporn Kavitanon made a whirlwind tour of the U.S. In two hectic weeks, the delegates spoke with over 100 food companies, including Borden, Campbell Soup, Hormel, Ocean Spray, FMC Corporation, and International Multifoods. "We must knock on, if not *down*, the doors of companies who could be prospective investors," said Kavitanon.

Once through those doors, the Thais expect to snag investors with a two-pronged hook. First they present the inherent advantages of operating in Thailand: cheap labor ($3.00 per day or less per worker); a sound infrastructure (unlike China); a modern communications network; over 150,000 sq. kilometers of paved roads; electrical power supplied by a national grid; relatively inexpensive land ($50,000 per acre developed and $20-$30 per sq. ft. construction costs); and ready access to domestic as well as to Asian markets.

The other prong is a tailor-made financial package. The Thais know other Asian countries have similar advantages, so in 1977, the government gave the Board of Investment teeth by passing the Investment Promotion Act (B.E. 2520). The BOI can bargain with potential investors, and it will offer: exemption or 50 percent reduction in import duties and business taxes on imported machinery; up to 90 percent reduction on import duties and business taxes on imported raw materials and components; suspension of corporate income taxes for from three to eight years; the ability to carry forward losses and deduct them as expenses for up to five years; and much more.

Sometimes the deals are too "sweet." Dr. Nimit Nontapunthawat, vice president, chief economist and manager of research at Bangkok Bank Ltd., commented, "Incentive packages are always strong, perhaps too strong. I don't know how long the BOI will offer these packages." Smiling, he finished by saying, "Now is a very opportune time to invest here."

Mr. Wisanupong Parksook, assistant managing director for General Foods Poultry, said BOI is helpful, but tightening up. "When we started up, the BOI saved us about US $50 million. But I understand BOI is getting stricter because the industrial estates are crowded. I believe we made the right decision at the right time."

The best opportunities

Thailand's emerging food industry has two dominant features. It is export oriented, and centered around canning.

Although more Thais are buying canned seafood these days, Thailand is still very much a fresh market. It is difficult to sell canned pineapple when fresh can be purchased for 10 baht. Therefore, investors can expect most if not all product to be exported,

(Continued on page 78)

THAILAND

Seafood Exports

	Volume Metric Tons	Value US$ Million	US$/ Ton
Canned tuna	39,862.4	78.4	1,966
Cuttlefish, fresh, chilled, frozen	37,549.0	66.4	1,786
Shrimp, prawns, lobsters fresh, chilled, frozen	19,428.2	118.4	6,093
Canned shrimp	11,632.0	38.8	3,335
Canned crabmeat	6,985.0	33.9	4,853
Canned baby clams	6,709.9	12.8	1,907
Shrimp, prawns, lobsters, boiled	4,304.5	14.9	3,461
Cuttlefish, salted, dried	3,736.4	33.3	8,912
Squid, fresh, chilled, frozen	3,426.9	4.1	1,196
Canned sardines	2,412.1	2.5	1,036
Shrimp, prawns, lobsters salted, dried	1,930.4	8.4	4,351
Canned cuttlefish	1,804.6	2.8	1,551
Squid, salted, dried	104.5	0.7	66,698

which is why many companies come there in the first place. Thai companies easily reach all of Asia, including Japan and China. "Some people use Thailand as the gateway to China," said Kavitanon. "Sometimes we're the back door."

The Board of Investment would like to see companies augment the canning industry. "The canning industry already is huge. What we need is upstream processing to add value," said Kavitanon. "Other forms of packaging would be welcome. We are looking for projects that take advantage of our wealth of fresh commodities."

To pin down what it is looking for, the BOI completed a study in February outlining the best investment opportunities. Those initiatives most likely to succeed will need to meet five criteria:

1. Make products for established export markets.
2. Make high value-added products
3. Incorporate high technology.
4. Require considerable labor.
5. Require implementation within five years.

BOI feels aquaculture projects are extremely viable, especially brackish shrimp farming. Thailand has had phenomenal growth with shrimp. In 1977, there were 1,437 farms. Today there are over 4,300

Seafood most established

Seafood canning is Thailand's most established segment. At last count there were 62 canneries. Of these, 19 received promotional privileges from the BOI. A government survey showed 65 percent of all production is fish, and the remaining 35 percent is crab, shrimp, and clams.

Thailand's 20,000 vessel fishing fleet ranks seventh in the world. Canned tuna makes up 55 percent of the 82,000 metric tons exported in 1984. About 23,250 metric tons were shipped to the U.S. West Germany was second with 5,326 tons.

Some opportunity remains. According to the BOI, any project would have to be large to survive the competitive marketplace. An alternative is canning other seafood such as cuttle fish, squid and mollusks.

Thailand also has a thriving frozen seafood industry. Over 80 percent is exported since the domestic market, as with other products, prefers fresh. In 1984, 19,500 metric tons of frozen shrimp, prawns, and lobsters were shipped. Over 7,000 tons went to Japan; the rest went to the U.S., Hong Kong, the U.K., Australia, and Singapore.

The next "growth" industry after seafood is canned fruit. Pineapple is the cornerstone, and it is rising every year. The first pineapple cannery was built only 16 years ago in Prachuap located in the middle of the long, narrow stretch of land that makes up central Thailand. In 1975, total pineapple capacity was 9 million cases. In 1985, over 200,000 metric tons were exported, mostly to the U.S., Germany, Canada, Japan, the Netherlands, and Saudi Arabia.

Exotic and tropical fruits are abundant. Papaya, mangoes, passion fruit, guava, tangarines and bananas grow all year. There is a market for canned or aseptically packaged juices and purees. Dole Pineapple is reported to have good success with a pineapple juice in a Tetra Pak carton.

Still, there are problems. Thai farmers lack high quality seeds. In addition, farms are not up to date. Corporations such as Dole or Cha-Um Pineapple must supervise their plantations carefully. Efforts are being made to educate farmers, but the task will take years. For example, some farmers will not monitor fruit size, or harvest when sugar content is right. On a more elementary level, some farmers resist the idea that they can do better financially when their entire harvest is taken by a big company rather than selling it off piecemeal themselves in the local market. The situation is definitely improving as the government works with farmers. However, the large corporations will still have to manage the crop for years to come.

One commodity starting on the ground floor is mushrooms. According to BOI, the

potential is worth the risk. The world market in 1985 was one million tons per year. Thailand exported a mere 16 tons. Singapore alone imported 1,000 tons of canned mushrooms back in 1981.

The Thais are perfectly capable of adapting. Pineapples are one success story, grapes, strawberries, and palm oil are others in the making. With grapes, for instance, the Thais had no substantial production before 1984. That year, they exported nearly 1,000 metric tons.

Opportunities also exist in meat, poultry and dairy. Since 1980, chicken production has climbed from 560,000 head to 850,000. Frozen chicken exports reached 30,000 metric tons last year, 90 percent going to Japan.

The meat industry is also growing quickly on the strength of joint ventures. Two major projects are in negotiation. Oscar Mayer and the CP Group, Thailand's largest agribusiness concern, are discussing slaughterhouses and export products. So are the Mah Boonkrong Group, and RFM of the Phillippines (the Swift brand licensee).

The domestic dairy industry was set up in 1962 with the help of the Danish. Most milk is UHT treated and pasteurized for the domestic market. Some diversification is taken place. A milk powder plant reportedly will be on stream by 1989.

Inside Thai food plants

BOI requires investors to work with Thai companies in joint ventures. Describing an "average" Thai food plant is difficult. Some are huge. Unicord Tuna employs over 4,000 people. Cha-Um Pineapple employs at least that many during the season, 2,500 per shift, and produces 20,000 tons of pineapple per day. Both have their own can making facilities and the equipment is new, fast and relatively sophisticated. On the other hand, one small export firm employs less than 100, and nearly all the work is done by hand.

Sanitation standards vary almost as much as size. General Foods Poultry near Bangkok could pass inspection by any agency in any country. Contact surfaces are all stainless steel, floors and walls are were built for washdown without crevices, workers wear gowns, hats, and gloves, etc. Moderately sized, GF employs 600 people and kills about 40,000 birds per day. But in another company we visited, workers carried product in plastic baskets, some broken and some unwashed.

Should you invest in Thailand?

Experts say Thailand is a good investment. It has raw materials, a sound infrastructure, good location, and inexpensive labor. Its disadvantages are especially cumbersome regulations and the often slow movements of the government.

There is a Thai legend about a statue supposedly made of lead. For centuries it stood in an obscure place in a *wai*, or temple. One day its was being cleaned when some of the lead came off. The statue was solid gold, hidden under a coating of lead to protect it from raiders.

An investment in Thailand is much the same. On the surface, the going can be rough—dealing with the loose bureacracy can be trying. Underneath, the effort can be pure gold.

Key Thai Economic Indicators 1982-1985

	1982	1983	1984	1985
		(Billions (US$ and %)		
GNP	35,564	38,997	40,600	37,240
Current prices	733	788	806	725
Per capita	23.0	22.8	20.2	18.0
At 1972 prices	13,411	14,268	14,658	13,306
Est. Growth rate	3.6	6.4	5.4	4.1
Debt. Service	1,522.6	1,750.8	2,009.7	NA
Ratio(%)	16.6	19.5	19.6	21.4
Imports				
Total imports	8,530	10,265	10,286	9,260
Total agri. imports	541	628	739	705
% of total	6.3	6.1	7.2	7.6
Exports				
Total exports	6,770	6,295	7,274	7,125
Total agri. exports	4,429	3,917	4,443	3,965
% of total	65.4	62.2	61.1	55.6
Balance of trade	-1,760	-3,970	-3,012	-2,235
Bal. of agri. trade	3,888	3,288	3,704	3,260
CPI	181.1	187.9	189.5	194.1
Food index	176.6	185.5	183.4	178.9
Terms of trade index	79.02	89.91	85.41	NA
Balance of payments	144	-786	446	456

Notes:
1985 data is preliminary. The Thai definition of debt service ratio excludes purchases of foregin currency (borrowings from IMF) and all debt with repayment periods of less than one year. If included, the 1985 foreign debt service ratio would be about 27.7%. Consumer price index (CPI) and food index are based on 1976 (1976 = 100). The terms of trade index is based on 1980.

Acidulants, like the food products they have historically acidified, occupy a mature market characterized by slow growth.

But recent marketing, regulatory and technological developments are boosting volume and applications for acidulants in certain market segments. Examples:

• The soft-drink boom is expanding use of phosphoric and citric acids, and to some degree malic, fumaric and lactic acids as well.

• Wine coolers, which soared from ground zero in 1982 to 86.2 million gallons in 1985, opened up a new application for citric acid. New malt coolers unveiled last year by several brewers also contain citric acid.

• FDA's August, 1986 ban on sulfiting agents as preservatives on fruits and vegetables served or sold raw to consumers (as in salad bars and supermarkets) boosts applications for acidulants as sulfite replacers. "The existence of these alternatives shows that FDA's action will not have a negative impact on the food industry," said the agency in it's July 9th ruling. Acidulants further show promise for preserving potatoes and potato products, where sulfites are currently GRAS but may be banned in a forthcoming regulation.

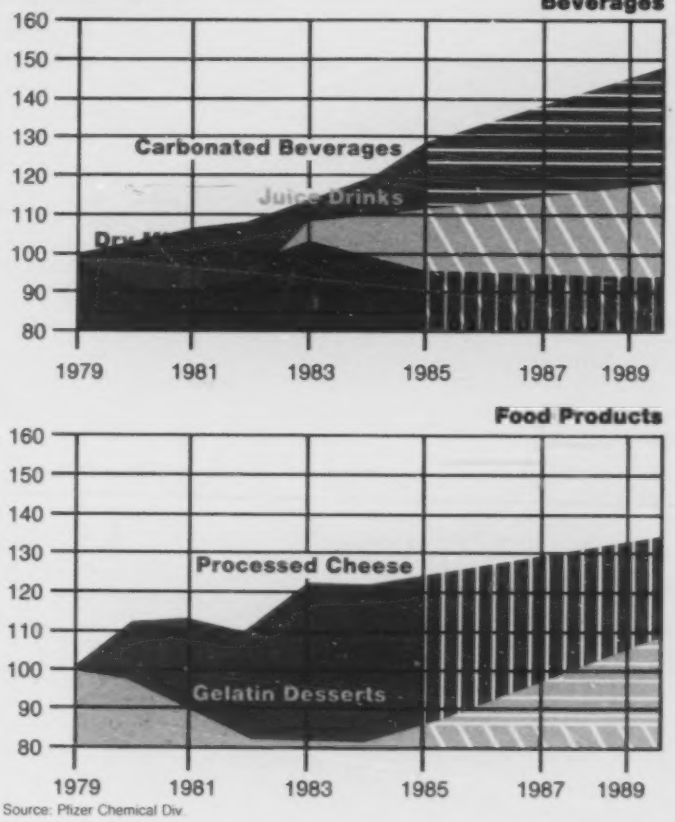
• In an ongoing technology, acidulants are safely reducing time/temperature requirements to upgrade quality of canned foods. In what may be a breakthrough, American Can Company's *Salad Bar Fresh* process (*FE* Apr., '85) applies acidulants to dramatically reduce thermal processing of low-acid foods, allowing some foods currently sold only fresh or frozen to be canned or other-

(Continued on page 84)

ACIDULANTS FIND GROWTH NICHES IN MATURE MARKET

New products, savvy marketing, regulatory trends and technical advances boost acidulant applications in some market segments.

ACIDULANTS



wise packaged for extended shelf life. Although the acidulants are GRAS, American Can at this writing was awaiting FDA acceptance of the process and had already licensed 35 canners to use the system. Salad Bar Fresh products may yet appear on supermarket shelves before the end of the year.

Basic trend: While most acidulant applications are mature, "future growth occurs where these applications are stimulated through increased advertising, promotion and new products," said Thomas E. Ruth, marketing manager for the Chemical Division of Pfizer, Inc., who discussed acidulant trends and developments at the annual meeting of the American Chemical Society last April in New York City.

Citric: Top gun

Acidulants perform a wide range of functions across a galaxy of food products. Major functions: To impart tart, tangy, sour tastes and modify other flavors; to lower pH, thus prevent growth of microbes which cause spoilage and food poisoning; to chelate trace metals in synergy with antioxidants, preventing discoloration and rancidity. Acidulants and their salts further control viscosity, serve as melt modifiers, gelling agents, buffering agents and emulsifiers.

Citric acid dominates the acidulant market. According to Pfizer, 1985 volume and market share of major food acidulants ranked as follows:

Acid	Use (Mil. Lbs.)	%Share
Citric	175	74
Phosphoric	35	15
Malic	10	4
Fumaric	6	2.5
Lactic	6	2.5
Adipic	5	2
Tartaric	1	
Total:	238	100

(Note: Figures for phosphoric acid exclude its derivative phosphates, some of which are used as acidulants.)

Carbonated: "Most exciting"

Major food applications for acidulants, said Ruth: Carbonated beverages, dry beverage mixes, processed cheese, single-strength juice drinks and gelatin desserts.

Carbonated beverages are currently "the most exciting," he continued. As shown on the accompanying graph, acidulant applications in this category soared at an annual rate of 4 to 8 percent (1982-85), and are projected to grow at roughly the same pace at least through 1990. Reason, said Ruth: The proliferation and promotion of new products, especially in the diet aspartame-sweetened segment which has expanded soft-drink market growth beyond mere population growth. New products such as carbonated drinks containing fruit juices, *Cherry Coke* and other "niche-targeted offerings" will keep this market growing.

Acids compete in some beverages and have no competition in others, Ruth continued. Phosphoric acid, used mainly to modify flavors in colas and root beers, has no competitors in cola due mainly to its low cost. Citric acid is most widely used in other carbonated beverages, but malic and fumaric acids are used for the same functions. Lactic acid is used in some soft drinks, such as pepper types, where it imparts a uniquely mild tart flavor.

Juice drinks lurched up sharply in 1982 with the introduction of aseptic packaging and a retreating recession but have since leveled off to slower, steadier growth. De-

Salad Bar Fresh process uses acidulant formula to reduce heat treatment and upgrade quality of low-acid foods in cans, retort pouches and retortable plastic containers. (Source: American Can Co.)

mand will continue to grow slowly, Ruth predicted. Dry beverage mixes bounced up about 7 percent in 1982 with the introduction of aspartame-sweetened products but have slowly declined since, probably due to the introduction of aspartame-sweetened carbonated beverages following FDA clearance for that application in 1983. This trend is expected to continue for several years.

Malic cuts aspartame costs

But cost savings might give acidulants another boost in the diet segment of the dry-beverage category. At IFT Food Expo '86 in Dallas, Denka Chemical Corp. cited a recent study showing that aspartame (which reportedly costs $90 per lb.) can be reduced 10 to 20 percent in sugar-free fruit-drink mixes by using malic acid or a blend of malic and fumaric acids as the acidulant.

Denka, which acquired the malic and fumaric acid lines of Alberta Gas Chemical last year, is the only U.S. manufacturer of malic acid and one of only two in North America, says Connie Dunn, assistant to the president at Denka. (The other: Bartek Chemical Co. in Ontario.)

Dunn expresses surprise at misconceptions about malic acid. "People identify it as 'the apple acid,' yet it's found in many fruits beyond apples," she points out. "The acid content of watermelon, for example, is 100 percent malic, yet at a trade show I was served a watermelon beverage containing citric acid. The food scientists serving it didn't know that watermelon is naturally high in malic and that they didn't need citric acid." Cherries are also very high in malic acid: One cherry-flavored wine cooler uses malic instead of citric acid as the acidulant.

ASPARTAME-SWEETENED SUGAR-FREE FRUIT PUNCH DRINK MIX

NOTES: Artificial Color is Red #40, 99.83%; Blue #1, 0.17%

Ingredients	Per Cent	Grams per Pouch @ 2 Quarts/Pouch
Malic Acid	49.7175	5.9661
Maltrin 10	29.2817	3.5138
Natural and Artificial Flavors	8.5783	1.0294
Aspartame	7.8917	0.0470
Cloud—Beatreme	1.8591	0.2231
Artificial Color*	1.4567	0.1748
Vitamin C	1.2150	0.1458
Total	100.0000	12.0000

Source: Denka Chemical Corp.

Sales of dry beverage mixes, which incorporate citric acid or other acidulants for tart taste, grew sharply with the introduction of aspartame-sweetened varieties.

Which way gelatin?

Among major food applications for acidulants, processed cheese grew at a rate of about 3 percent per year in 1980-84 and should continue growing at an annual rate of 2 percent through 1990 based on population growth and slightly increasing popularity, said Ruth.

Demand for gelatin desserts, after declining for four years, started growing in 1984 with the new aspartame-sweetened sugar-free products, but the future—as shown on the graph—is uncertain. "Will this category behave like carbonated beverages and maintain new growth, or will this be another situation like dry beverage mixes, where demand will flatten and drop off?" asked Ruth rhetorically. "Only time and the marketing staffs at General Foods and Nabisco Brands can tell."

(Continued on page 86)

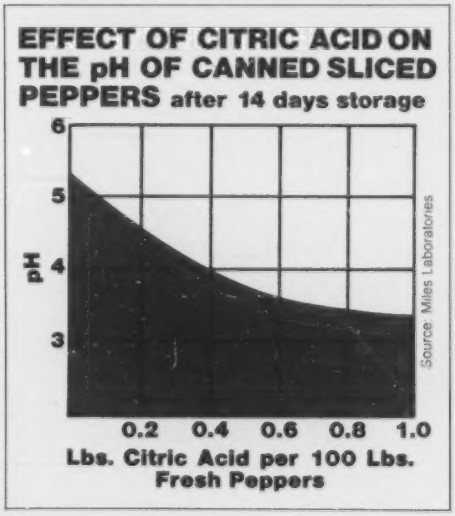
Blends of citric acid and erythorbic acid show promise of replacing sulfites as preservatives on potatoes and potato products. (Source: Pfizer Chemical Div.)

Sulfite replacers

Synergistic blends of citric acid and erythorbic acid or ascorbic acid (Vitamin C) can replace sulfites to prevent browning of fresh fruits and vegetables in the wake of FDA's sulfite ban.

According to Miles Laboratories, studies they have done comparing acidulant blends with sulfites demonstrated that sliced lettuce dipped in a citric/ascorbic bath for 30 seconds, then packaged in oxygen-permeable bags and refrigerated at 38°F resisted discoloration for five days compared to seven days for lettuce treated with sulfites. Further studies showed that shelf life can be extended by combining the acid treatment with vacuum packaging, so tests with Cryovac packaging are now underway, said Thomas R. Schmidt, manager of applications research at Miles.

Applications of acidulants to replace sulfites actually surged in 1983-84 when major food-service operators voluntarily switched to citric acid and citric acid/phosphate blends in response to reports of allergic reactions to sulfites, said Schmidt. "That demand has leveled off," he added. "The next stage is applying acidulants to preserving potatoes and apples."



Heat-sensitive peppers can now be canned by lowering pH with citric acid to allow heat processing as "acidified foods" under FDA regulations. (Source: Miles Laboratories)

To prevent browning of vegetables for two to four hours at room temperature, Miles recommends immersion in a 1 to 2 percent citric acid bath for 30-35 seconds. For longer preservation, Miles recommends a solution of 0.3 to 1 percent citric-and 0.05 to 0.5 percent ascorbic or erythorbic for 45 to 120 seconds, followed by vacuum-packaging and refrigeration.

Pfizer recommends a 5:1 citric/erythorbic blend to retard browning of fresh fruits and vegetables. In tests at Pfizer, lettuce dipped for 1 to 3 minutes, then packaged and refrigerated, resisted browning for six days. Sliced Red Delicious apples dipped in the same bath resisted browning in air at room temperature for more then four hours.

Citric/erythorbic and citric/ascorbic blends further show promise for preserving potatoes. In tests at Pfizer, raw potatoes dipped in a citric/erythorbic bath for 2 minutes, packaged and refrigerated resisted browning for more than 48 hours. Preliminary results of tests at Miles using a citric/ascorbic blend with Cryovac packaging on sliced potatoes indicate shelf life of 14 days at 4°C (39°F).

Crispier canned foods

Since the 1920s, canners have used acidulants where necessary to lower product pH to 4.6 and below to assure destruction of dangerous microorganisms while reducing time/temperature of heat processing to preserve product quality—taste, texture, color, nutritional values—to the highest possible degree. Citric acid is most commonly used. Reducing time and temperature further cuts energy costs and speeds up production.

This is an ongoing technology. Example: Fresh peppers are low-acid products with pH ranging from 4.9 to 5.8 depending on variables such as type, growing conditions and ripeness and are especially heat-sensitive. If processed under 21 CFR 113 specifications for low-acid foods "you'd end-up with mush," says Schmidt. Recent studies by Miles demonstrated that peppers can be acidified to allow canning as "acidified foods" under 21 CFR 114 and standards of identity for "certain other canned vegetables " under 21 CFR 115 and 155. Sliced green peppers with an initial pH of 5.5, for example, can be lowered to pH 4.2 by adding 0.3 percent citric acid. Sweeter, crispier peppers can now be preserved in No. 10 cans for the food-service and ingredient markets.

A new growth area for citric acid in acidifying foods: Pasta, said Schmidt. Until recently, pasta products such as spaghetti in

(Continued on page 88)

sauce were available only in cans and were somewhat "mushy." Citric acid reduces heat treatment so these products can now be packaged in jars; reduced heat treatment further firms texture and upgrades appearance. This will lead to further applications for pasta meals such as spaghetti with meatballs and lasagna, Schmidt believes.

American Can Company's Salad Bar Fresh process applies a proprietary acidulant formula called *PHM-1* to significantly reduce thermal processing for low-acid foods in cans, glass, retort pouches, retortable plastic cans and trays. According to Richard P. O'Neill, director of marketing for processed foods at American Can, 45 to 50 products have been successfully tested to date and 35 canners of national and regional brands are licensed to use the process.

Pillsbury, for one, seems excited. "It has the potential to improve the consumer's perception of canned food quality while creating significant new-product opportunities for Green Giant," said Gary Klingl, group vice president at Pillsbury.

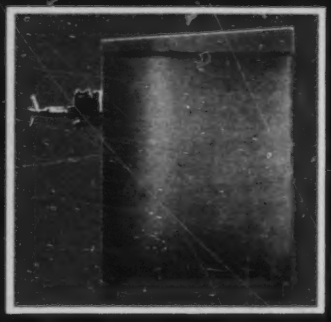
Salad Bar Fresh allows dramatic reductions in time and temperature while upgrading taste, texture and color. Example, said O'Neill: A typical process to achieve commercial sterility of diced carrots at their natural pH in a 303x406 can is about 30 minutes at 240°F. When the PHM acidulant is used, the process drops to 11 minutes at 220°F—down nearly two-thirds in time and 20 degrees in temperature. Carrots are crispier and brighter with less carmelization and cooked flavor.

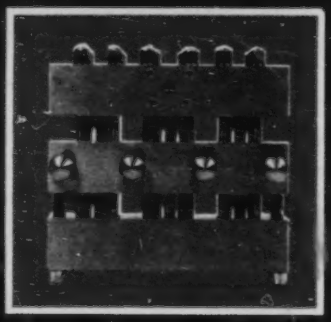
Salad Bar Fresh allows canning of heat-sensitive foods—such as cauliflower and melon balls—never before successfully canned, says American Can, and upgrades quality of traditionally canned foods such as pasta, vegetables, rice and shrimp. With shrimp, the process reduces salt requirements while yielding firmer texture. Canners can reportedly use the process with little or no added equipment, no special can enamels or special containers. Further advantages: Increased retort throughput, lower energy and cooling-water costs.

Salad Bar Fresh should allow canning or barrier-plastic packaging of entrees currently sold only as frozen foods, says American Can. Tests with consumer focus groups in 1985 and 1986 evoked favorable comparisons with fresh foods.

So, regardless of the "maturity" of the market, there is, literally a world of applications still for acidulants. And the exploration will go on.

- Pressures up to 14,500 P.S.I.
- Capacities from 25-10,580 GPH
- Efficient and energy saving homogenizing system
- Aseptic design available
- Automatic capacity and pressure control systems
- 3-part valve housing with interchangeable valve seats and ball valves in Stellite or tungsten carbide, ceramic pistons; for long life and ease of service
- 4 models—33 types
- Reversible interchangeable solid ceramic plungers





Homogenizers and High Pressure Pumps for the Food & Dairy Industries.

Niro Atomizer Food & Dairy, Inc., now marketing all Rannie equipment in the U.S. at 1600 County Road F, Hudson, WI 54016, 715-386-9371 • TLX 910-575-8060.

Insert 40 on Inquiry Card

Insert 41 or see FEM, p. 12 →